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TITLE: Aspirating hypodermic syringe

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ABPL:

A hypodermic syringe for injection of anaesthetics must be designed in such a manner that aspiration can be made easily and preferably without the necessity to inject some of the anaesthetic prior to the aspiration. In syringes of the type intended for cooperation with a cylindrical ampoule having a displaceable plunger for closing one of its ends whereas the other end is closed by a diaphragm, it is further important to prevent the diaphragm and plunger from being damaged during injection so that air may enter into the ampoule. A syringe meeting these demands is provided in that a sleeve-shaped piston rod is adapted to be governed by the internal wall of the ampoule, the rod being fitted to an operating member which, however, is axially displaceable in relation to the rod and connectable directly to the plunger by means of a connecting device extending through the piston rod. The operating

member is  
designed as a two-part plate, one part of which is shaped as a  
one-finger-manuevered lever operating against projections in the  
piston rod and  
intended via the connecting device to bring about the required  
motion of the  
plunger for effecting aspiration.

#### BSPR:

The plunger of certain types of known cylindrical ampoules is  
designed in such  
a manner that it forces a diaphragm inwards, when acted upon by a  
piston rod,  
so a limited quantity of fluid is expelled. When the pressure upon  
the piston  
rod is removed the diaphragm returns to its original position,  
sucking fluid  
back into the ampoule. In this manner it is possible to ascertain if  
the  
needle has entered into a vein or in the tissue. Injection of an  
anaesthetic  
into a vein would cause grave troubles during the application of  
odontologic  
local anaesthesia. A disadvantage with syringes of known type is  
that it is  
necessary to inject some of the anaesthetic, or the like, in order to  
bring  
about the desired aspiration. During the injection it may further  
happen that  
the piston rod breaks the diaphragm, whereby air may enter the  
ampoule. Heavy  
forces upon the plunger may deform the latter, whereby the  
clearance between

the piston and the cylinder wall will be so big that air may enter the ampoule.

BSPR:

A further objective is to obtain a way to better determine the quantity of fluid aspiration than has been possible with earlier types of syringes where the aspiration occurs automatically when the pressure upon the piston rod is removed.

BSPR:

The aim of the present invention is to eliminate the disadvantages of the known syringe, and to propose a syringe of simple design, which is cheap to manufacture, handy to use and where further the aspiration and the injection may be performed without changing the grip upon the unit.

DEPR:

With all odontologic local anaesthesia it is desirable to inject the anaesthetic into the tissue, either sub-muscularly in the location where the anaesthesia is desired (infiltration anaesthesia) or around a nerve trunk leading to the location where it is desired to kill the pain (convection anaesthesia). Injection into a vein should be avoided from medical as well as from practical point of view, as the risks for general complications

are big,  
and the anaesthetic will be rapidly washed away from the point of injection.  
It therefore is a requirement that an aspiration shall be made before the injection proper, and this is, according to the invention, brought about by forcing plate part 16 downwards, whereby spigot 6 of plunger 5 is pulled backwards sufficient to cause a sub-pressure in the ampoule. Hereby fluid from the injection locality may flow into the ampoule. If the aspiration is negative the pressure may be applied on the full plate 15, 16 whereby the piston rod will act upon plunger 5 and the injection occurs. From aspiration to injection there is no need to change the grip of the fingers around the syringe, whereby a full guarantee against intravasal injection is obtained, as the position of the needle will not be changed.

CLPR:

1. In a hypodermic syringe of the type cooperating with a cylindrical ampoule and provided with means for performing aspiration prior to injection, having a displaceable plunger connected to a piston rod and closing one end of said ampoule, said plunger being provided with an axial spigot extending from the

end surface of the plunger proximate said ampoule and projecting  
endwise beyond  
the end surface of the plunger remote from the ampoule, said  
piston rod being  
sleeve-shaped and telescoped within the cylindrical internal wall of  
the  
ampoule, said ampoule having a hollow needle extending from the  
other end  
thereof, the improvement wherein said piston rod at its end remote  
from the  
ampoule engages an operating device axially sliding against the  
outer surface  
of said piston rod, said operating device being connected to  
clamping means  
extending through slits in said piston rod towards the inside and  
engaging with  
said plunger over a connecting device attached to said piston rod,  
said  
connecting device extending through said piston rod and having  
means engaging  
with said axial spigot on movement of said operating device  
toward said  
ampoule, the outer end of said operating device being provided  
with a divided  
end plate, one portion of which is fixed to said operating device  
and the other  
portion being hingedly connected to said fixed portion, said hinged  
portion  
turning outwards on movement of said operating device toward  
said ampoule by  
projecting means on the outer rim of said piston rod, repositioning  
of said  
hinged portion lifting up said spigot by said connecting device,

thereby  
causing an inward bulging of said proximate end surface of said  
plunger,  
resulting in aspiration.